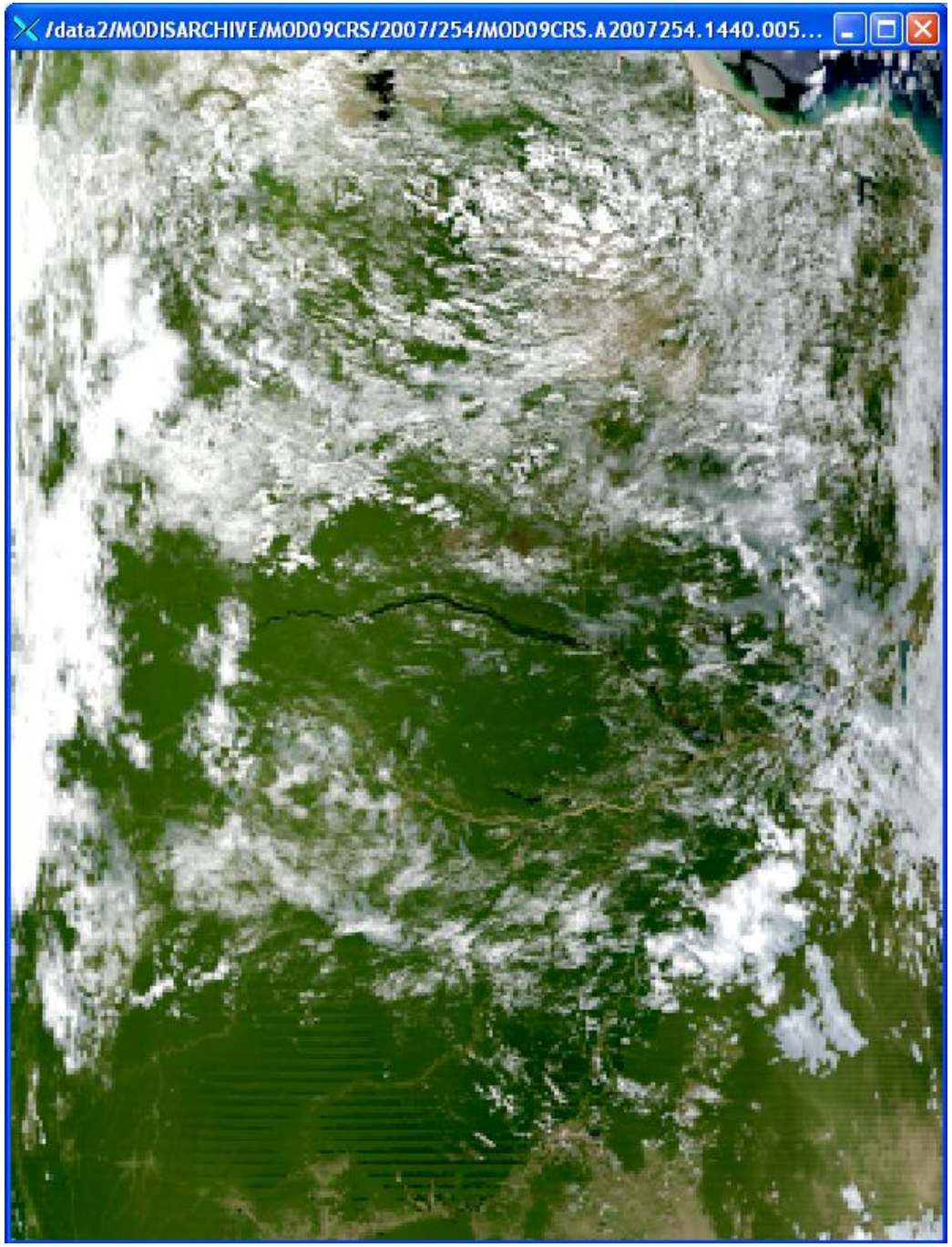
Polarization sensitivity on Terra: impact on Land surface reflectance products

Eric Vermote

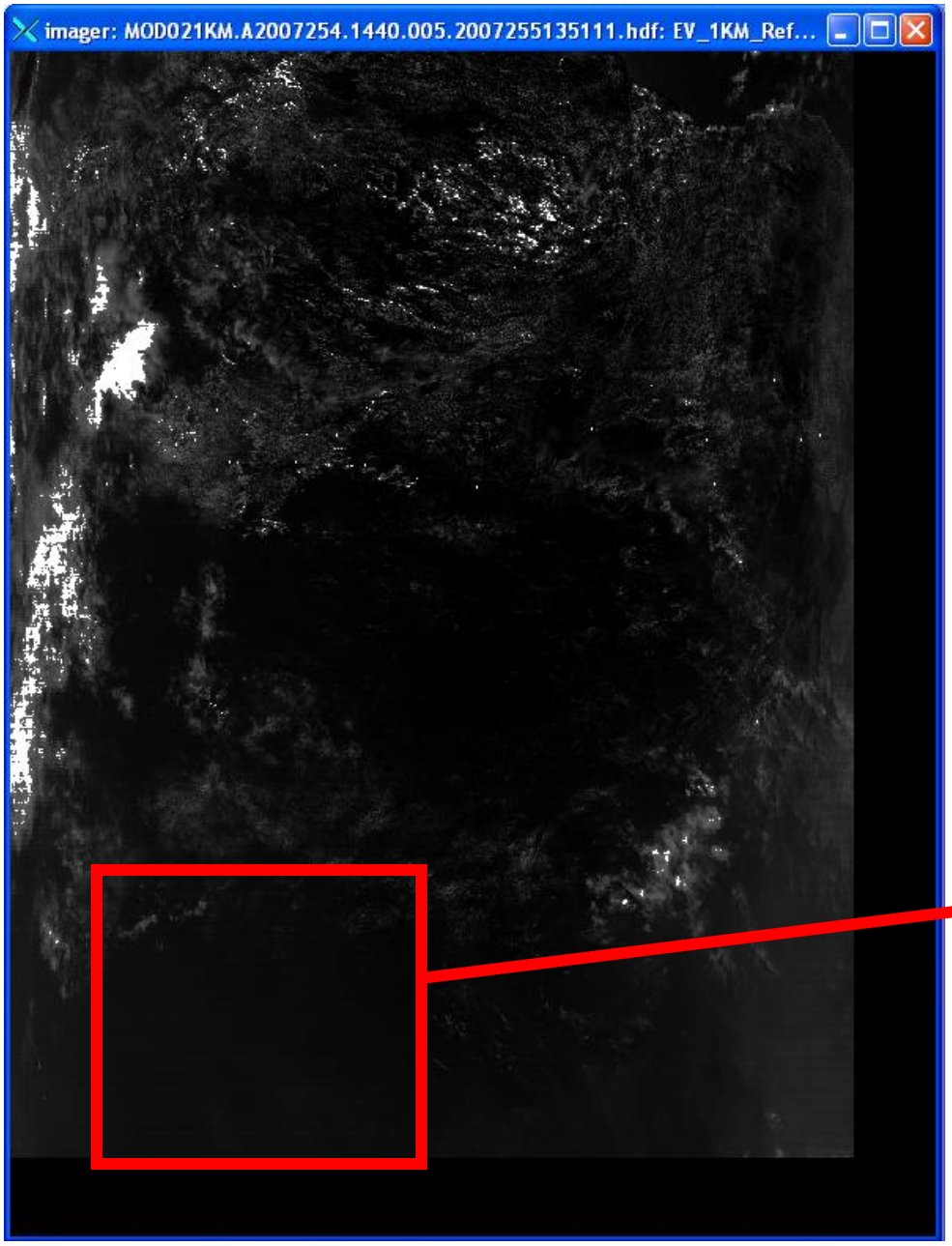
Sadashiva Devadiga

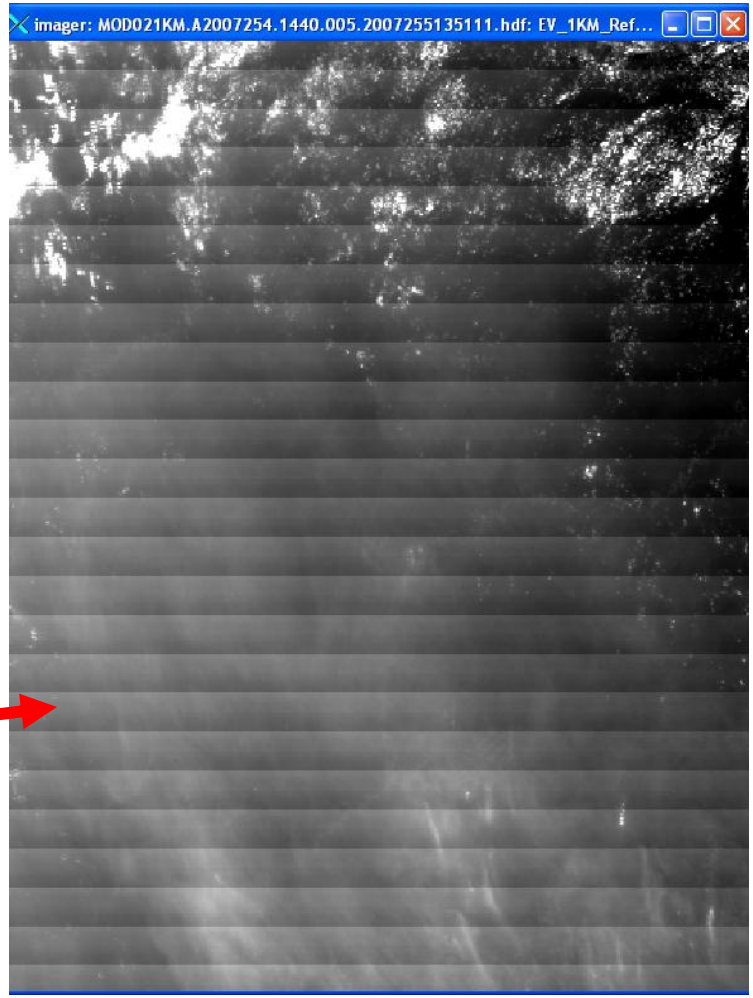
Polarization effect at 412nm depending on mirror side for Terra (band 8)



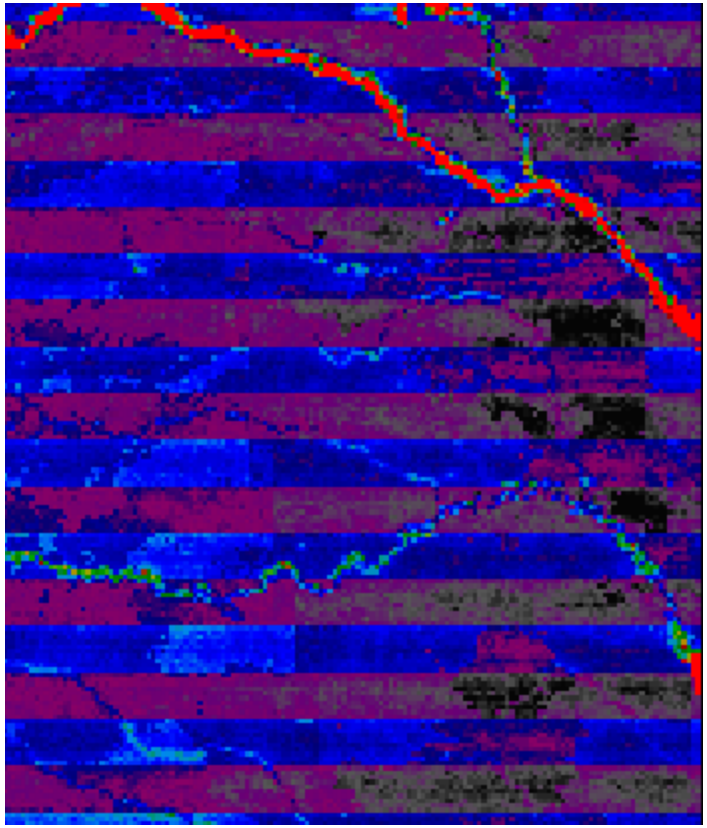
- Pbs detected over the rain forest at high aerosol level (between 0.8-1.2): band 8 noise make the aerosol model switch to high to low absorption

Band 8/ Band 8 details



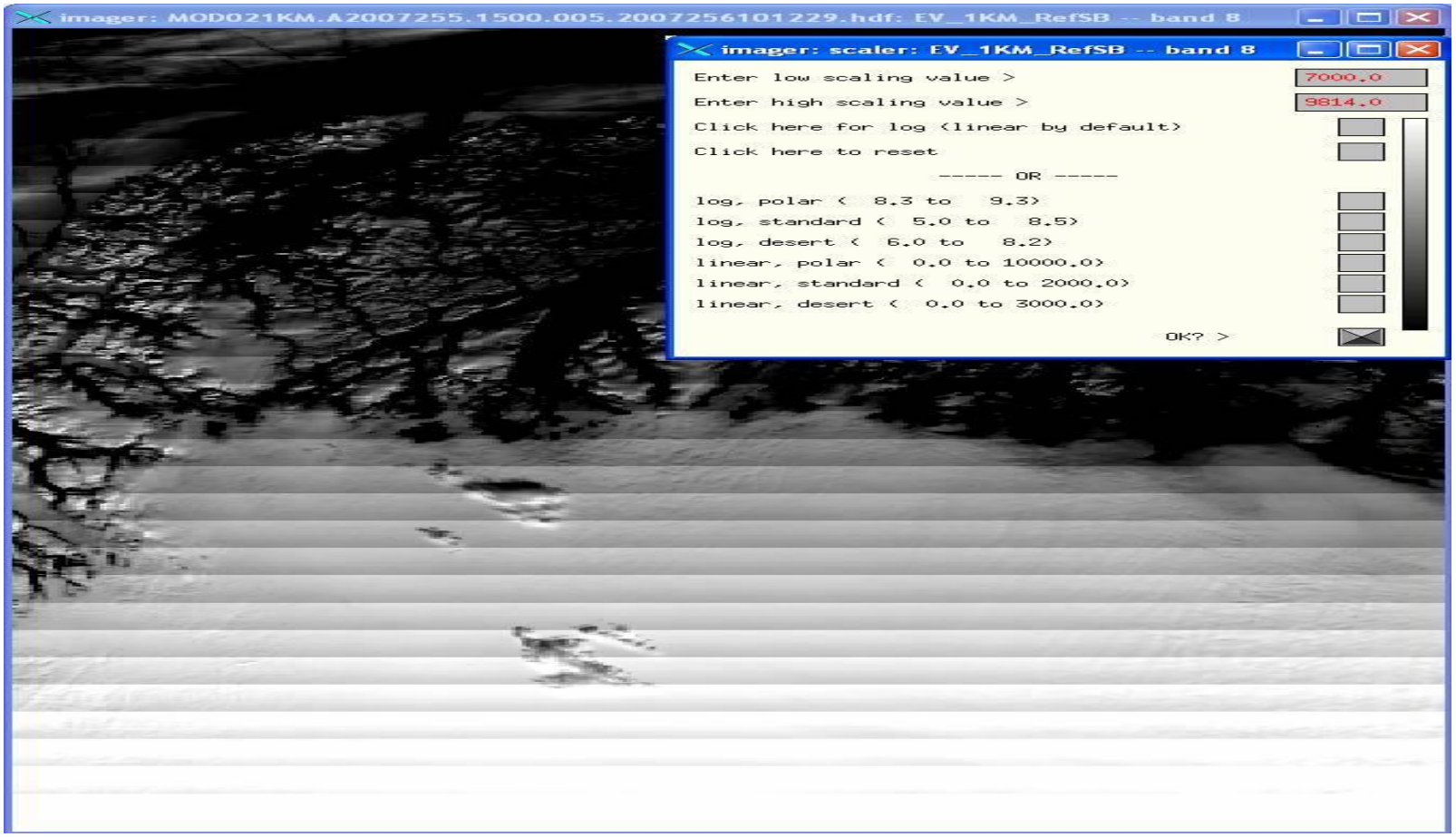


Terra, Band 8 (412nm) Mirror side calibration artifact

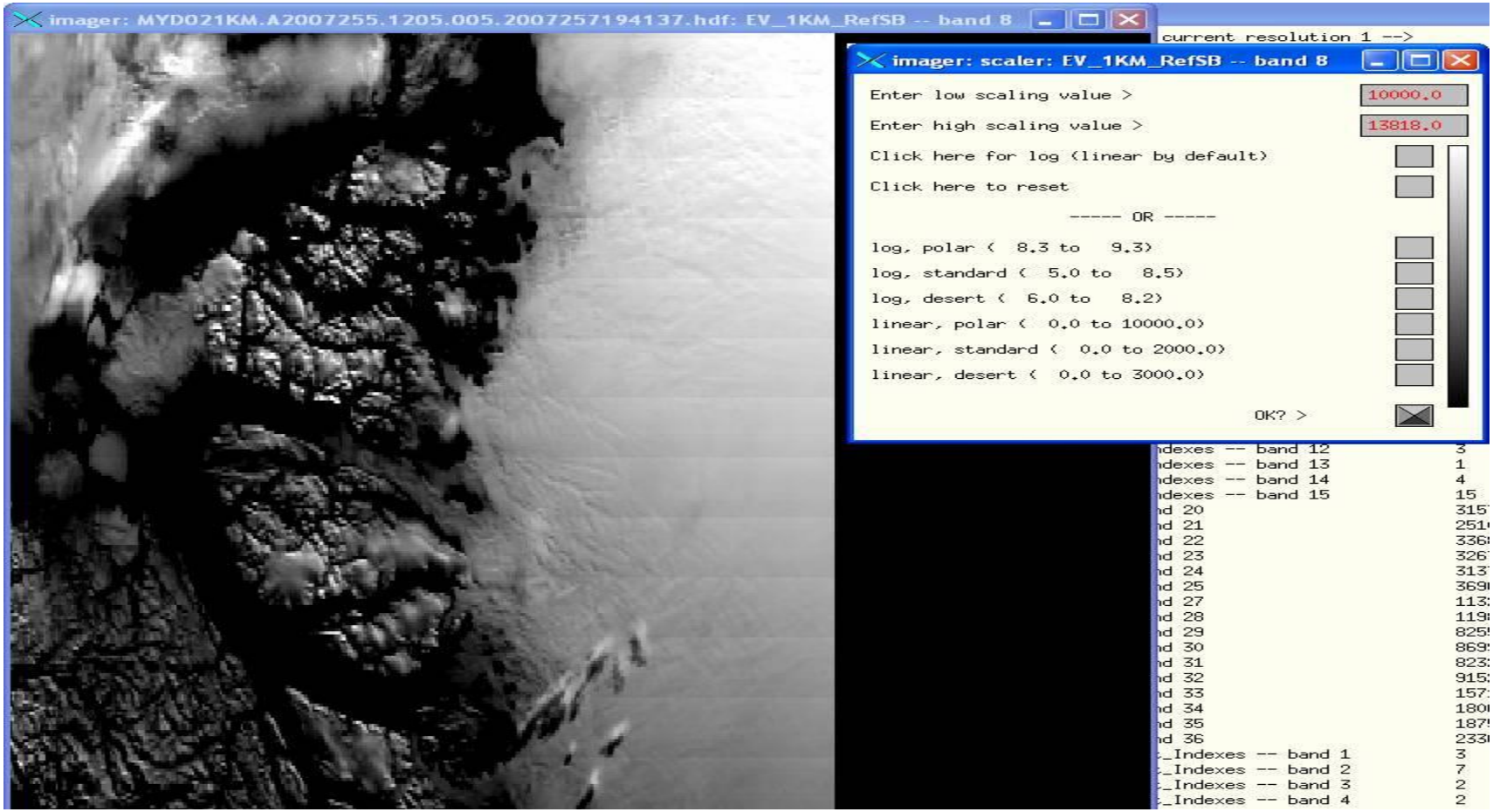


Surface reflectance in band 8, changing From +0.007 to -0.003 over a forest area in south America.

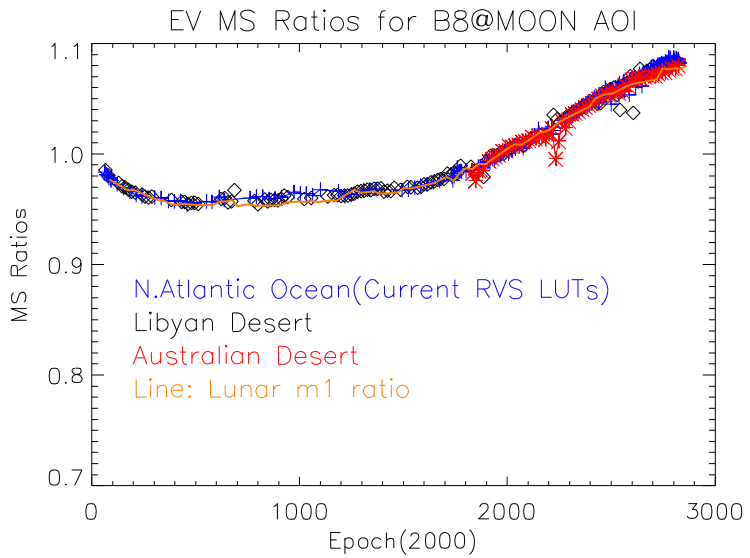
Mirror side effect in Terra band 8 despite mirror side equalization also visible over snow/ice target (polar zone)

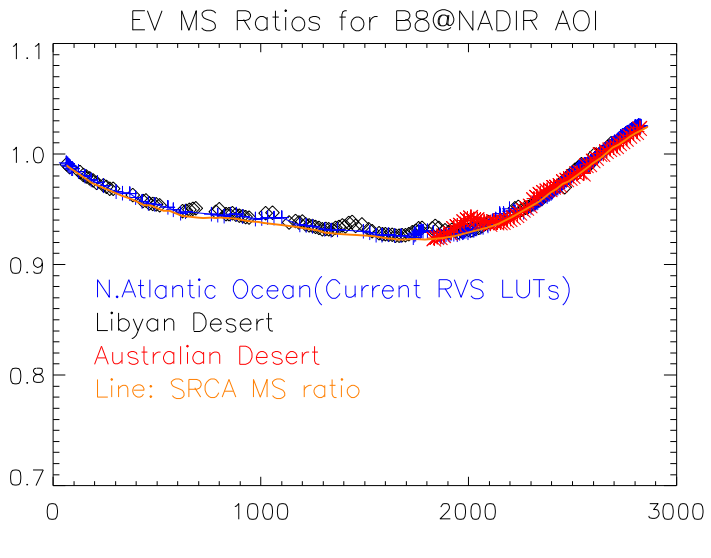


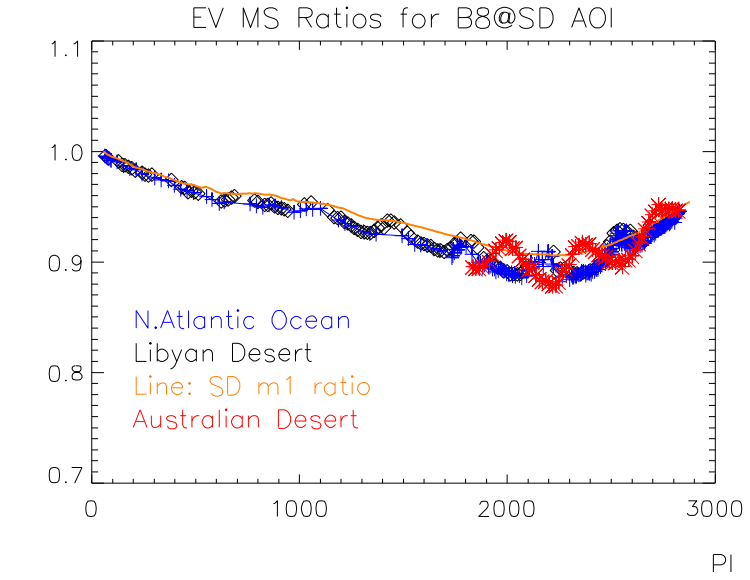
This is not apparent on Aqua data

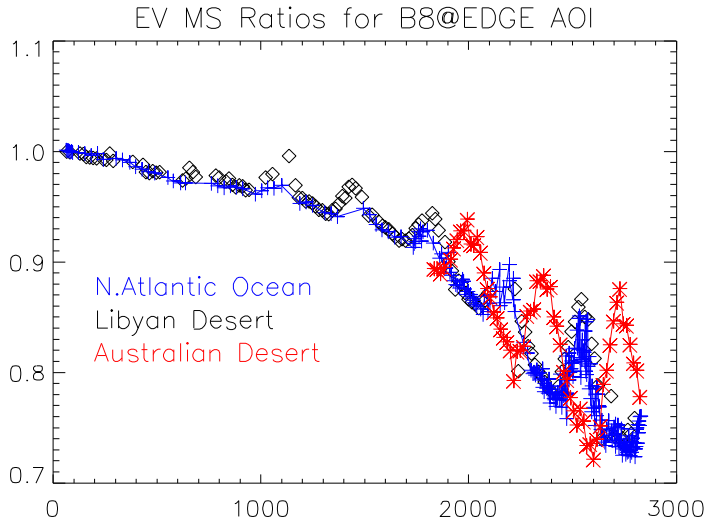


Terra Mirror side ratio is dependent on AOI (fine) but Australian and Lybian desert give different ratio at EDGE AOI

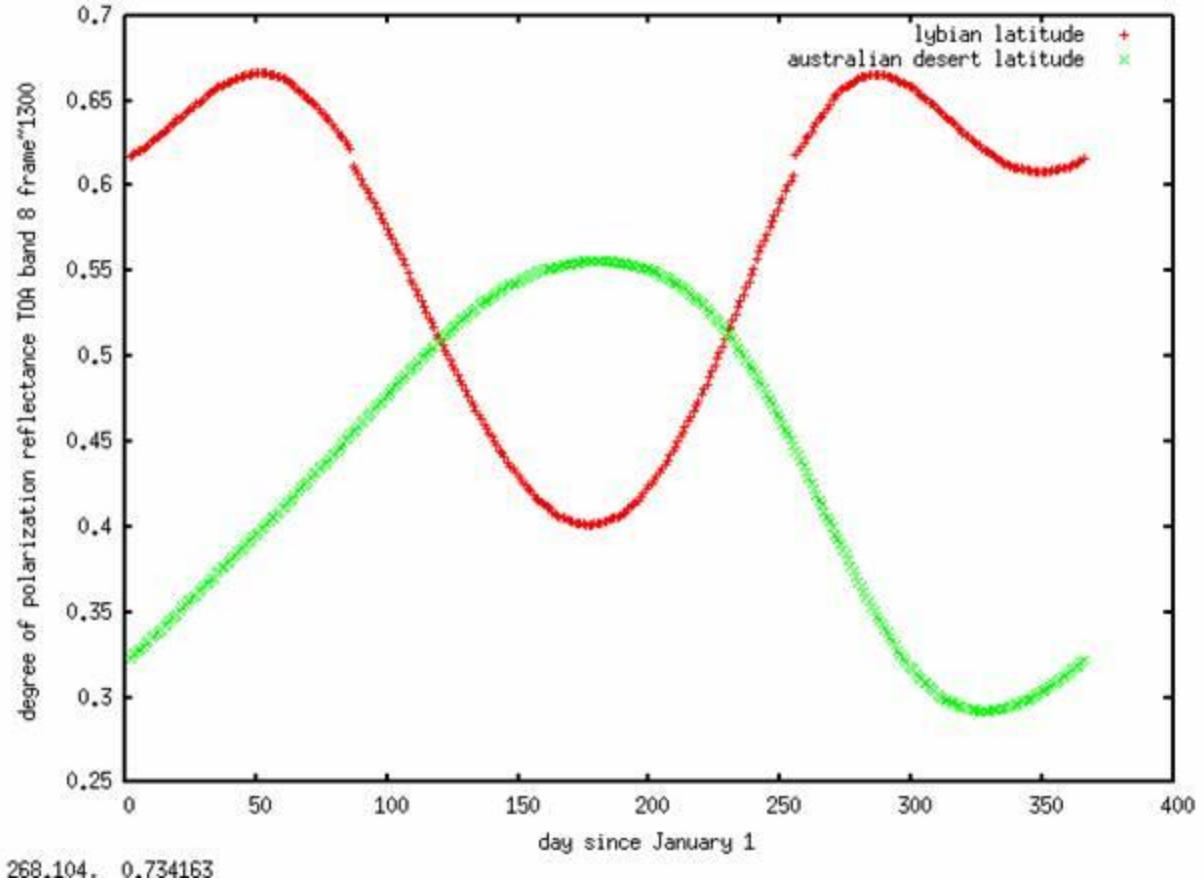






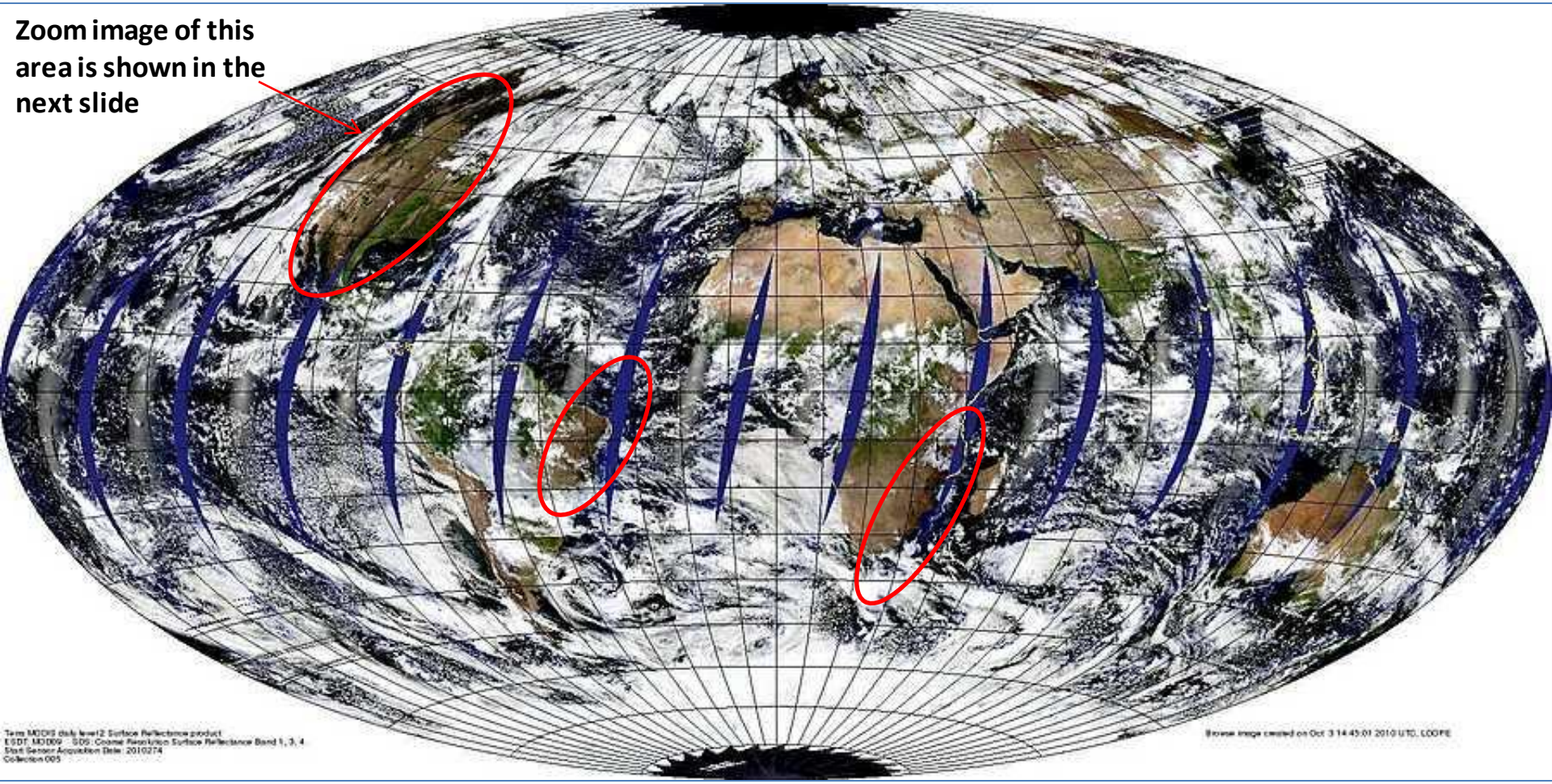


Polarization simulation over desert sites may explain the previous results: The polarization over Lybia and Australia are out of phase



Polarization problem is now impacting Band 3

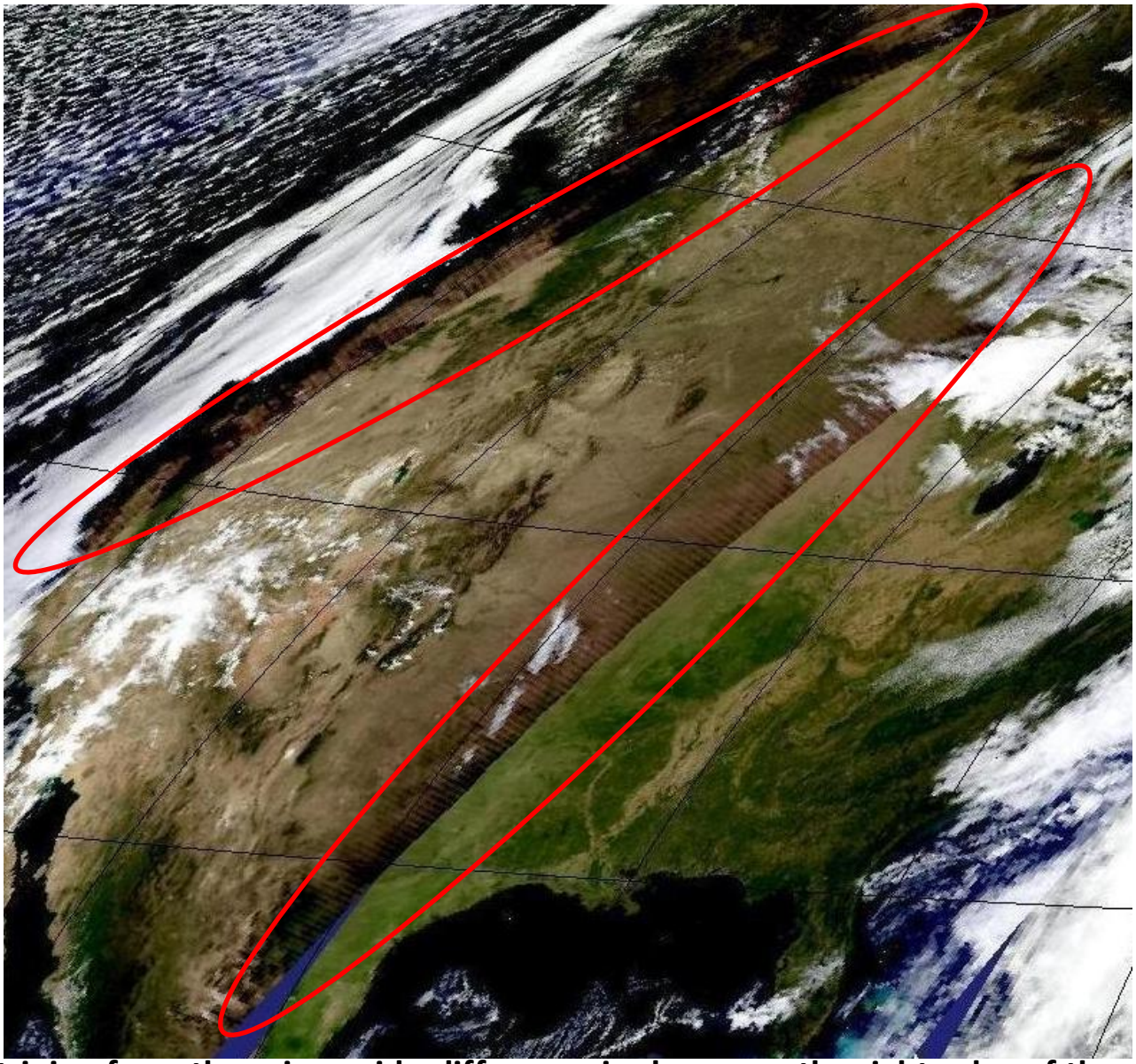
Anomaly visible in the Global Browse of Surface Reflectance Terra MODIS: Day 2010-274



- Image is an RGB composite of Surface Reflectance from bands 1, 4 and 3.
- Anomaly is present only on the right edge of the swath and is visible when AOT using band 3 is retrieved and is used for correcting the reflectance.
- Though the anomaly seems to be systematic and present in every day retrieval, the presence and severity of the anomaly varies and the cause is still not fully understood.

Surface Reflectance from Terra MODIS Day 2010-274

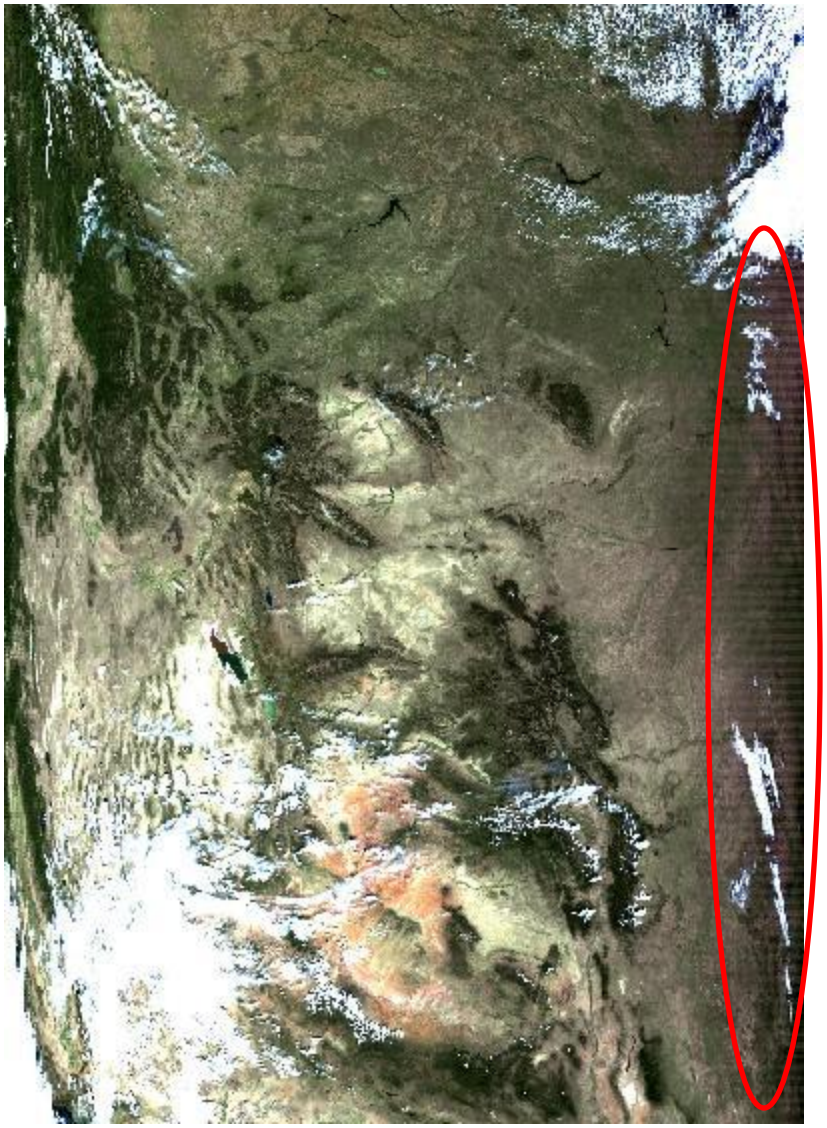
A Spatial Subset (North America) from the browse image



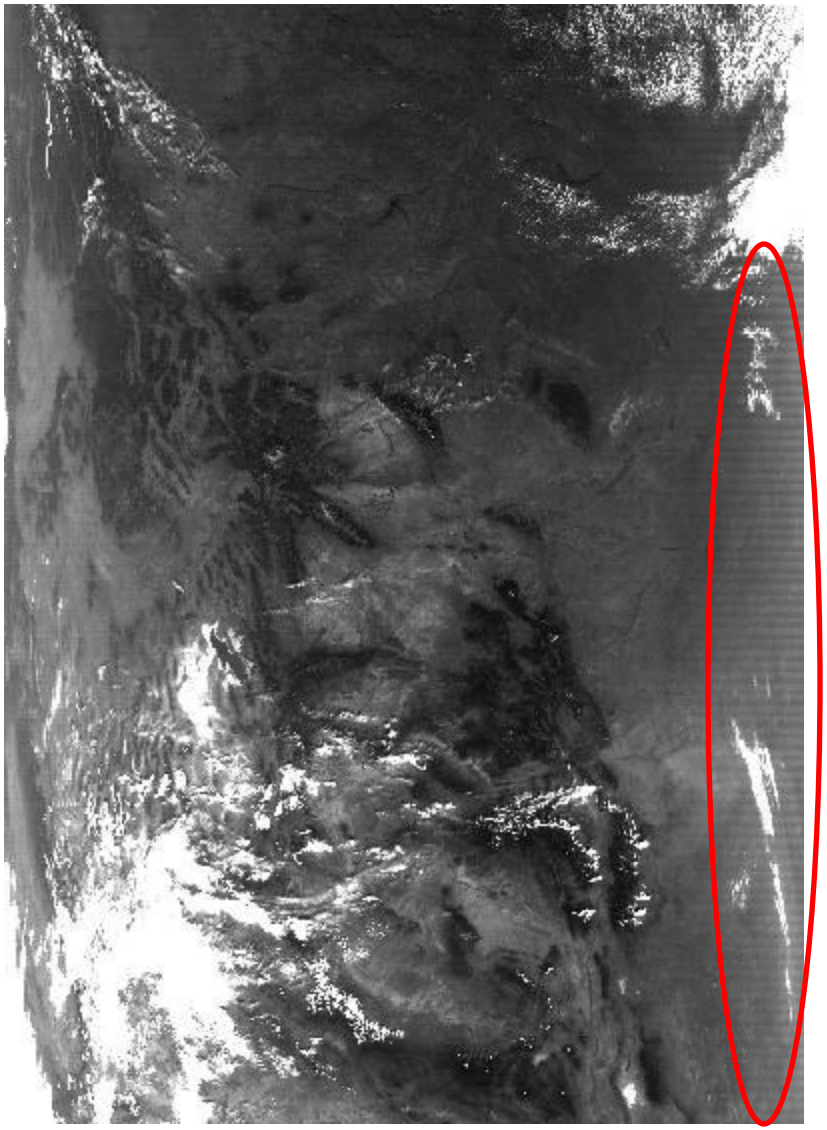
Striping from the mirror side difference is always on the right edge of the swath, at swath angle ~ > 60 deg.

Terra Granule 18:10 from 2010-274

(from the orbit passing over North America in the previous spatial subset)



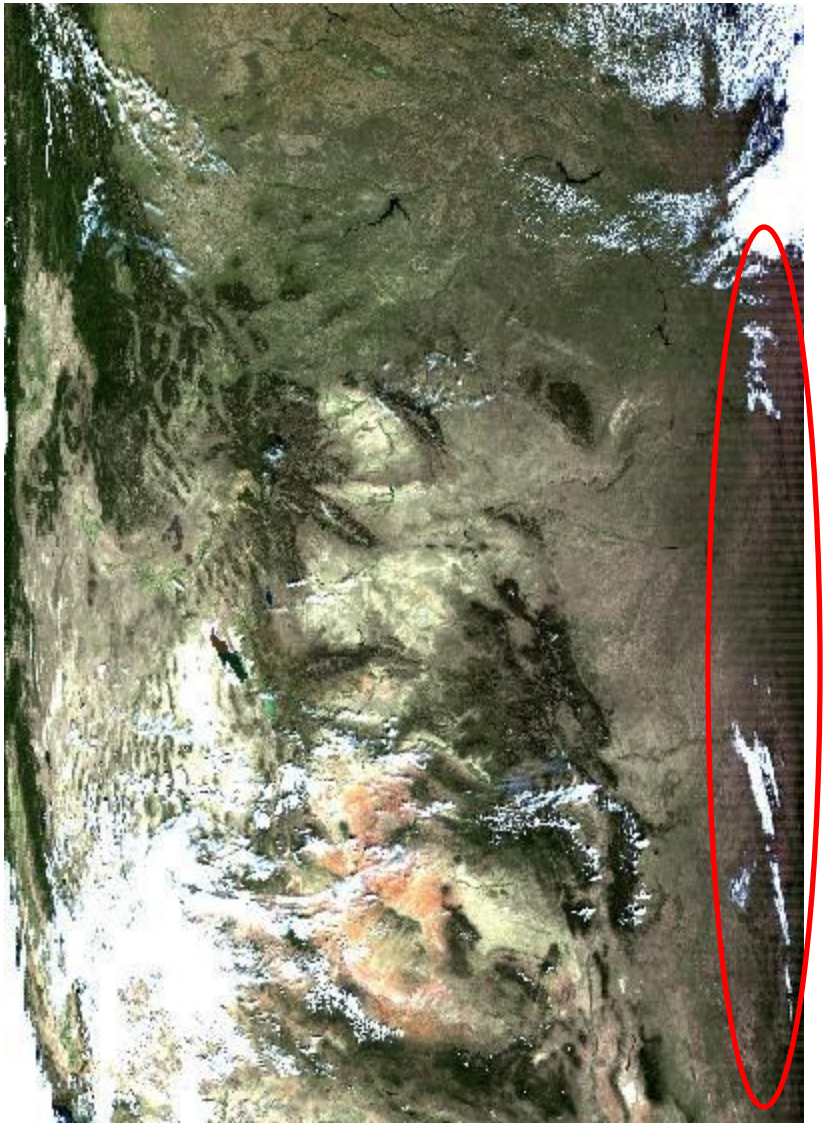
RGB composite of LSR bands 1,3 and 4



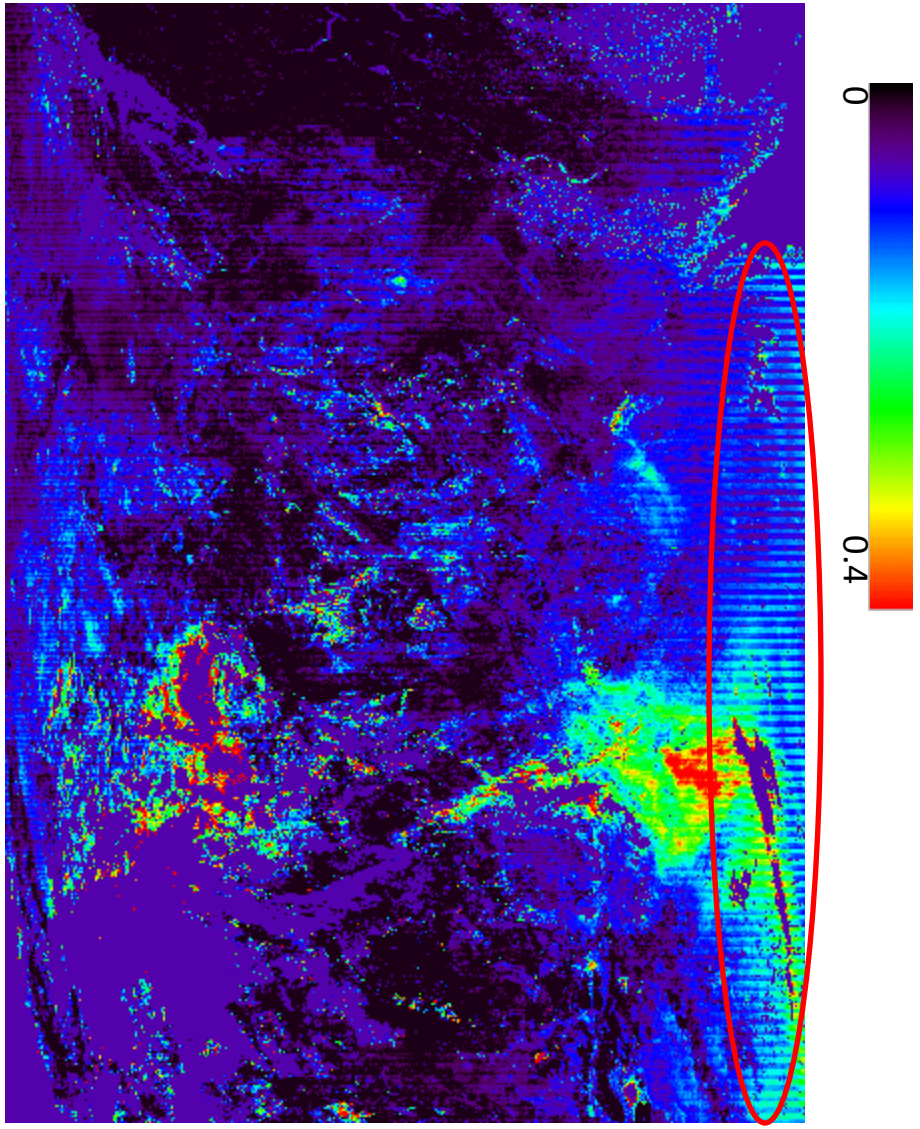
L1B: 1km TOA reflectance Band 3

Striping resulting from overcorrection in the LSR visible on the right side of the granule. Similar striping visible in Band 3 from L1B

Terra Granule 18:10 from 2010-274



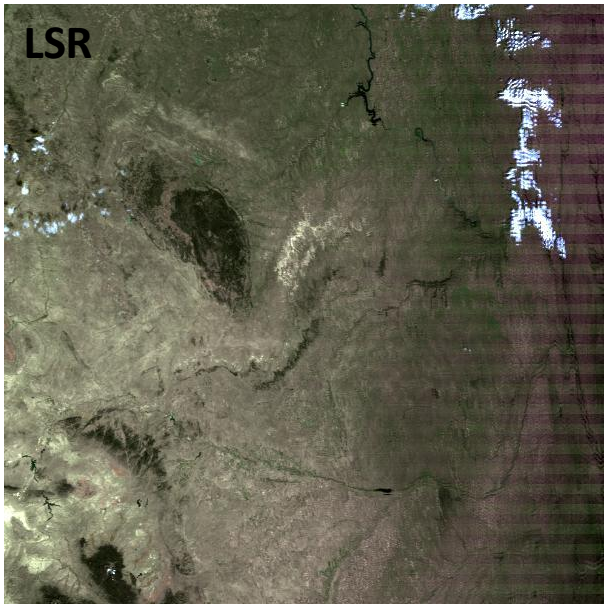
RGB composite of LSR bands 1,3 and 4

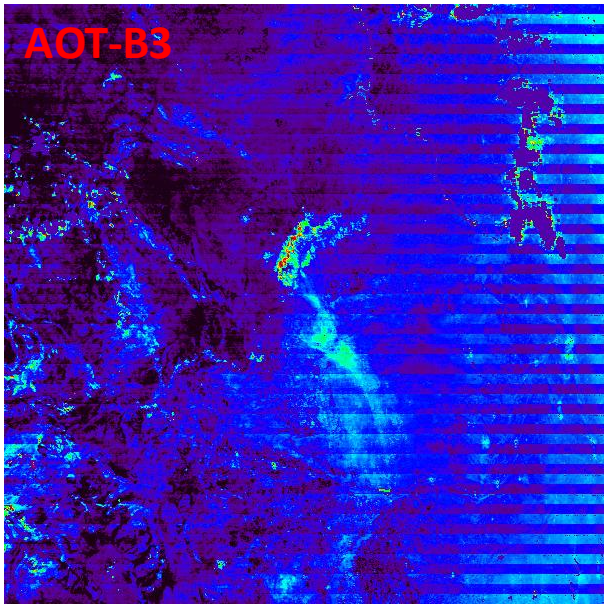


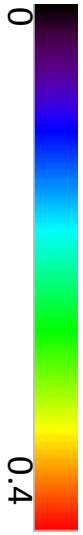
Band 3 AOT from MOD09

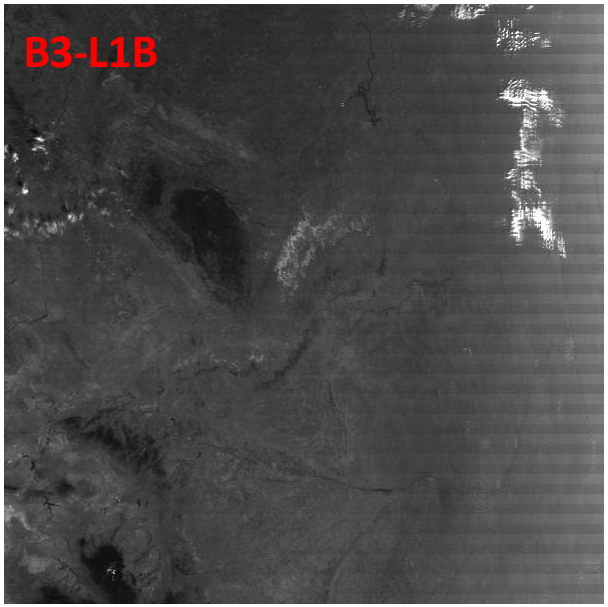
Striping resulting from overcorrection in the LSR visible on the right side of the granule

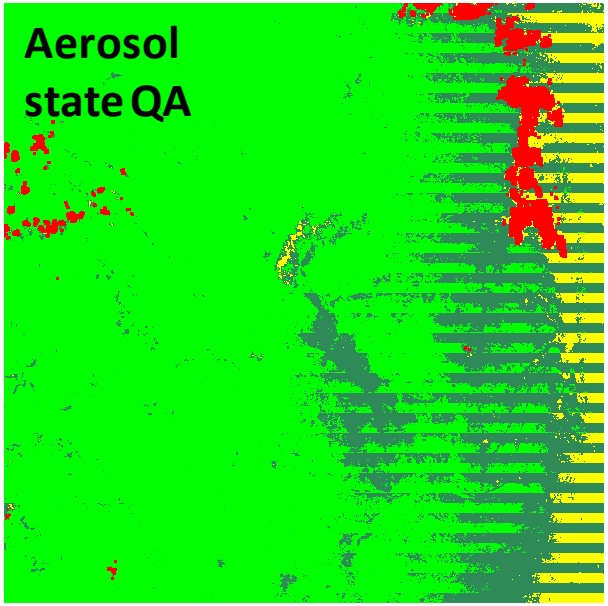
Spatial Subset from the right side of the granule show overcorrection of LSR in alternate scans. This striping matches the striping seen in L1B band 3.

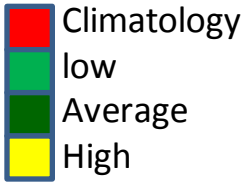






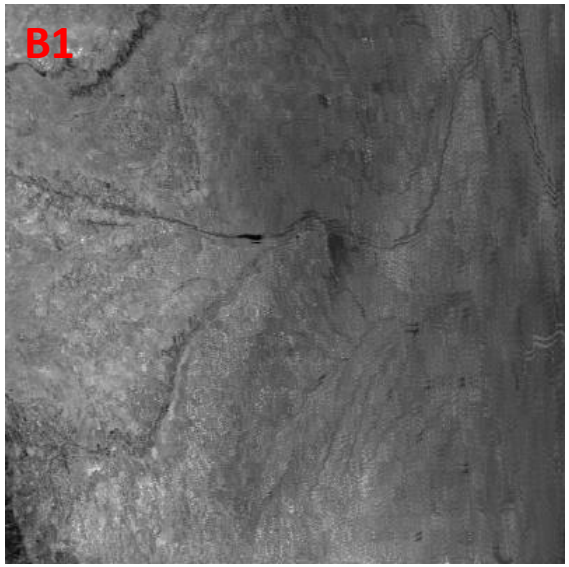


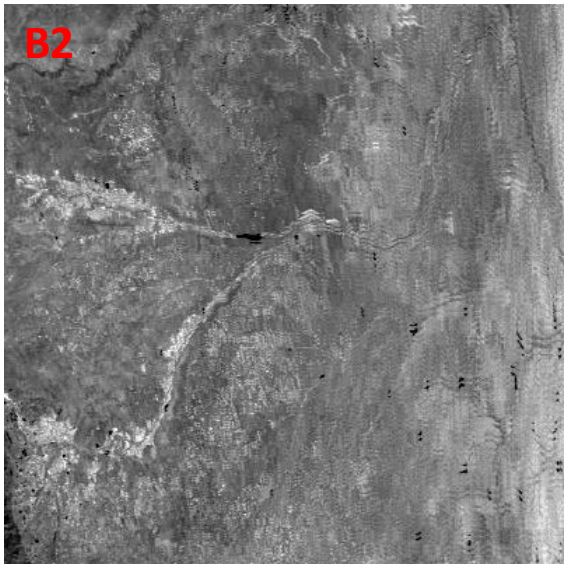


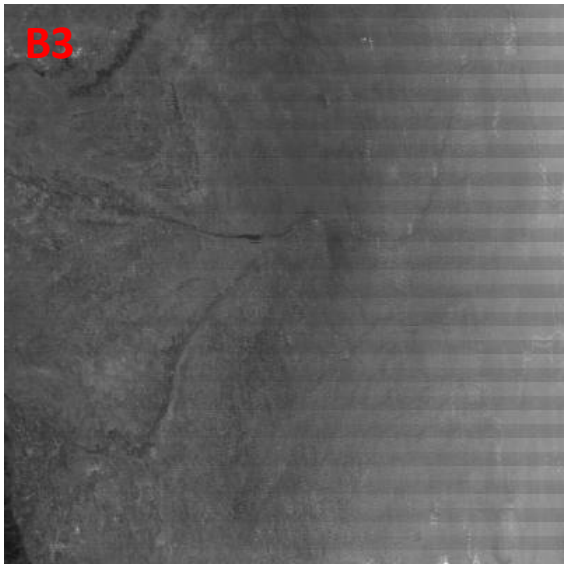


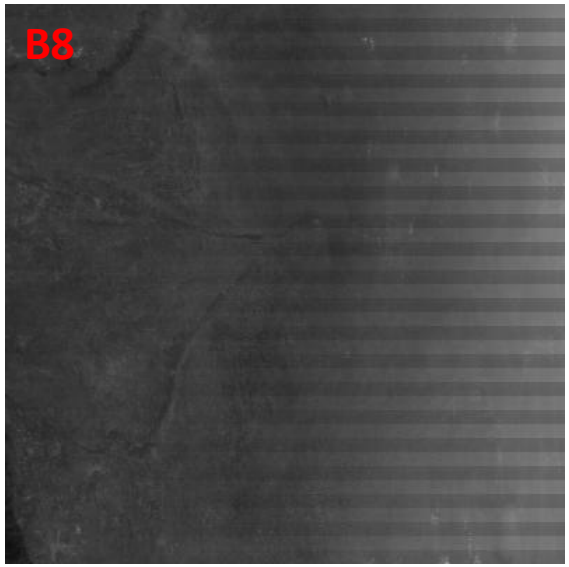
TOA Reflectance in L1B

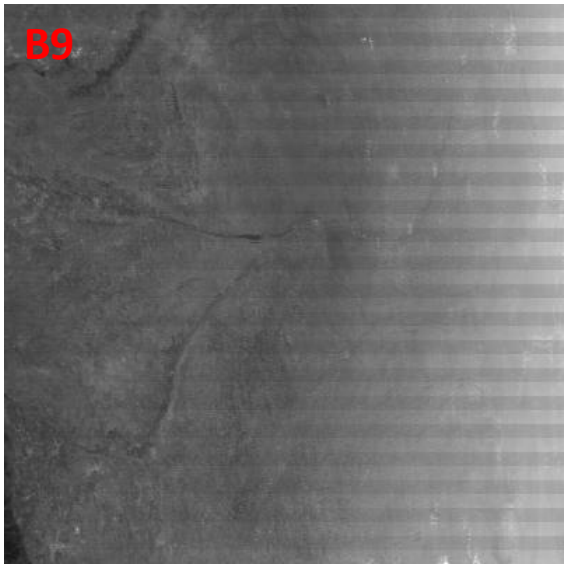
Spatial Subsets from Terra MODIS L1B Granule: MOD021KM.A2010274.1810.005

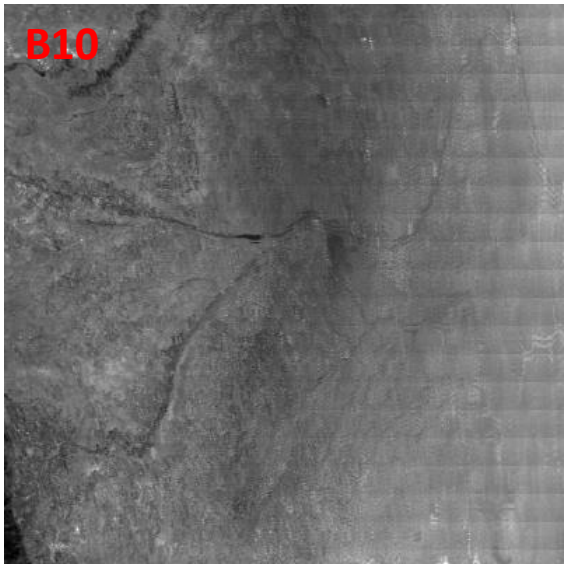












Bands 3, 8 and 9 have identical striping (vertical profile in the next slide). Band 10 may have been affected by single detector striping.

Vertical Profile of TOA Reflectance in L1B

MODIS L1B Granule: MOD021KM.A2010274.1810.005 (sample 1325)